Data Report

Surface Water Quality Monitoring at the Gay Mine: Spring 2004

Prepared for

J.R. Simplot Company
&
FMC Corporation
PO Box 912
1150 West Highway 30
Pocatello, Idaho 83204

Prepared by

Parametrix
411 108th Avenue NE, Suite 1800
Bellevue, Washington 98004-5571
(425) 458-6200
www.parametrix.com

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ACRONYM LIST

AOC	Administrative Order on Consent
AWQC	Ambient Water Quality Criteria
BIA	Bureau of Indian Affairs
BLM	Bureau of Land Management
Cd	Cadmium
CLP	Contract Laboratory Program
COPC	Chemicals of Potential Concern
Cr	Chromium
CWA	Clean Water Act
DO	Dissolved Oxygen
GPS	Global Positioning System
HDPE	High Density Polyethylene
IDAPA	Idaho Administrative Procedure Act
IDEQ	Idaho Department of Environmental Quality
LCS	Laboratory Control Sample
LIMS	Laboratory Information System
LOEC	Lowest-Observed-Effect-Concentration
NAD83	North American Datum of 1983
Ni	Nickel
NOEC	No-Observed-Effect-Concentration
QA	Quality Assurance
QC	Quality Control
RA	Risk Assessment
SAP	Sampling and Analysis Plan
Se	Selenium
SW	Surface Water
USEPA	United States Environmental Protection Agency
UTM	Universal Transverse Mercator
V	Vanadium
WER	Water Effect Ratio
WQS	Water Quality Standards
Zn	Zinc

EXECUTIVE SUMMARY

In March 2004, Parametrix prepared a Sampling and Analysis Plan (Parametrix, 2004) to guide the collection of surface water samples at a variety of locations at the Gay Mine, a historic phosphate mine in Southeastern Idaho located on the Fort Hall Indian Reservation. In April 2004, Parametrix personnel, accompanied by personnel from the Shoshone-Bannock Tribes, Bureau of Indian Affairs (BIA), Bureau of Land Management (BLM), and the J.R. Simplot Co., collected surface water samples from 27 of 35 designated sampling locations at the site. Eight (8) of the designated sampling areas could not be sampled as no flowing water was encountered. Sampling efforts were scheduled to coincide as closely as possible with peak runoff springtime hydrologic conditions, i.e., the high-flow period associated with a typical spring snowmelt season. The purpose of this focused sampling event was to characterize baseline concentrations at the site for six metals of potential concern: cadmium, chromium, nickel, selenium, vanadium, and zinc. Sample analyses were conducted by SVL Analytical, Inc. of Kellogg, Idaho.

All samples were prepared and analyzed within holding times and using appropriate methods. Sample filtration for dissolved analyses was not conducted in strict accordance with the Sampling and Analysis Plan (Parametrix, 2004); however this deviation did not affect sample integrity or quality. Analytical accuracy and precision were acceptable, as demonstrated by the results of the laboratory quality control analyses. Field quality control sample results were also acceptable. No data were rejected based on an independent data quality review. Sample data for regulated surface waters (e.g., streams, rivers, reservoirs, contributing waters from seeps, springs or intermittent runoff pathways, etc.) were compared against the corresponding chronic surface water quality criteria protective of aquatic life for the metals of interest. The values used were the lower value of either the current State of Idaho Numeric Criteria for Toxic Substances for Waters Designated for Aquatic Life, Recreation, or Domestic Water Supply Use (IAC, 2003a) or the current USEPA National Recommended Water Quality Criteria for Priority Toxic Pollutants (USEPA, 2002a). Data for non-regulated waters (e.g., pit lakes, ponds, sedimentation basins, etc.) were compared against the removal action levels for surface waters not subject to current water quality standards specified in the State of Idaho's Area Wide Risk Management Plan for the Southeast Idaho Phosphate Mining Resource Area (IDEQ, 2004).

In general, metal concentrations at most sampling locations were less than the corresponding water quality criterion or removal action level. Only Site 013 (A12 Lake in A12 Pit) was found to have a total recoverable selenium concentration (638 μg/L) that exceeded the corresponding removal action level for non-regulated surface water (210 μg/L).

All data reported are considered to be valid, representative of the samples collected, and acceptable for further use.

1. INTRODUCTION

1.1 PURPOSE AND SCOPE OF SAMPLING

Surface water samples were collected from 27 of 35 designated sampling locations at the Gay Mine in early April 2004 (April 6-8) following the procedures established in the approved Sampling and Analysis Plan (SAP) (Parametrix, 2004). The purpose of this focused sampling event was to characterize the levels of specific metals (i.e., cadmium, chromium, nickel, selenium, vanadium, and zinc) potentially present in surface water during peak spring high-flow conditions and a near normal precipitation year. The current report presents the analytical findings of this sampling event.

1.2 SITE DESCRIPTION AND HISTORY

The Gay Mine is located on the Fort Hall Indian Reservation, approximately 25 miles northeast of Pocatello, Idaho. The Gay Mine is an inactive surface phosphate mine formerly leased either individually or jointly by the J.R. Simplot Company and FMC Corporation (the Companies) from 1947 to 1993. Lands for the mine and supporting facilities and mining leases were procured through the Bureau of Indian Affairs (BIA), who leased the lands on behalf of the Shoshone-Bannock Tribal Nation and individual landowners (EMI, 2003). The area encompasses mine offices, railcar loading tipple, scales, and maintenance and support facilities in addition to ore extraction areas, waste (rock and overburden) storage areas and mine pits (EMI, 2003). In the early 1950s, mining operations proceeded northward into the North Limb area. The East Limb area was opened in 1955, and the South Forty area was opened in 1986 (EMI, 2003). Various reclamation and cleanup activities at the mine have occurred through 1999.

Hydrologically, the site is situated along a local drainage divide, with the Portneuf River to the east, Lincoln Creek to the north, and Ross Fork Creek to the west. A number of mine pond end-pits remain from historical mining activities and at least five of these pits can contain water year-round and are accessible to livestock and wildlife. The mine is located between two large regional groundwater systems: the Snake River aquifer to the west and the Portneuf Valley aquifer to the east (Brown and Caldwell, 2000). Prior studies have indicated the absence of a continuous shallow groundwater system (water table) beneath the site (Brown and Caldwell, 2000); however, the combination of geologic structures present and historical mining patterns have resulted in the formation of multiple localized hydrologic systems with variable water levels (Brown and Caldwell, 2000). Hydraulic connection between these perched groundwater systems and deeper regional aquifers beneath the Portneuf and Snake River Valleys do not appear to exist.

1.3 REPORT ORGANIZATION

The remainder of this report is organized into the following sections:

- Section 2.0, Sampling Overview
- Section 3.0, Sampling Results
- Section 4.0, References Cited
- Appendix A, Sampling and Analysis Plan
- Appendix B, Field Sampling Notes
- Appendix C, Site Photographs
- Appendix D, Laboratory Data Reports
- Appendix E, Data QA/QC Review

2. SAMPLING OVERVIEW

The Parametrix field sampling team traveled to Pocatello, Idaho on Monday, April 5, 2004. After meeting with Bruce Winegar (J.R. Simplot) and Shoshone-Bannock tribal representatives to reconnoiter several potential sampling locations, actual sampling began on April 6, 2004 and continued through April 8, 2004. Jim Simmons, a former J.R. Simplot (Gay Mine) employee and now an independent consultant, as well as Shoshone-Bannock technical representatives Canden Tanaka and Jason Pappani, accompanied the Parametrix field team on all three days of sampling. Additionally, on the first day of sampling, Dean Fox of the BIA and Bill Stout of the BLM also accompanied the field sampling team. Sampling was conducted in accordance with the procedures established in the approved SAP (Parametrix, 2004). A copy of the approved SAP is provided in Appendix A.

2.1 SAMPLING LOCATIONS

Sampling locations were established in the approved SAP (Appendix A; Parametrix, 2004), although field confirmation of the type of site being sampled (i.e., background, upstream of mine, downstream of mine, etc.) was required for some sampling locations. Sampling locations were confirmed using a hand-held Global Positioning System (GPS) unit and the geographic coordinates (i.e., latitude/longitudes in degrees, minutes, and seconds) were projected in the North American Datum of 1983 (NAD83). In order to be consistent with previous work conducted, site coordinates were converted from Geographic NAD83 to Universal Transverse Mercator (UTM) Zone 12 NAD83 (in meters) at the client's request.

Sampling locations are identified on Figure 2-1 (see map in pocket) and summarized in Table 2-1, which includes site identification numbers, site descriptions, site types, map coordinates (both Geographic NAD83 and UTM Zone 12 NAD83 coordinates), and the number of samples collected. Shoshone-Bannock sample split locations are also identified.

In addition to the samples collected from the locations identified in Table 2-1, field quality control (QC) samples, including field duplicates, sample bottle blanks, and filter blanks, also were collected as described in the approved SAP (Appendix A; Parametrix, 2004).

2.2 OVERVIEW OF SAMPLING PROCEDURES

The Parametrix field sampling team conducted the surface water sampling at the Gay Mine according to the procedures specified in the approved project SAP (Appendix A; Parametrix, 2004). An overview of the procedures from the approved SAP follows.

2.2.1 Site Selection

The approved SAP (Appendix A; Parametrix, 2004) identified 35 approximate sampling locations consisting of various surface water sources including springs, creeks, and pit lakes. For each site, a hand-held Garmin® GPS 12 unit was used to confirm or refine the latitude/longitude coordinates listed in the SAP (Appendix A; Parametrix, 2004). Additionally, the field crew marked each sampling location with a 1" x 2" wooden stake to allow for easy site identification during future sampling events. Each stake was labeled on both sides with the letters "SW" to denote surface water and the assigned three-digit site number (see Table 2-1). Due to a lack of water at some sites, samples were only collected from 27 of the proposed 35 sampling locations.

Table 2-1. Sampling Locations, Site Descriptions, and Number of Samples Collected

Site No.	Site Description	Site Type [1]	Geographic Coordinates [2] Latitude	Geographic Coordinates [2] Longitude	UTM Coordinates [3] X	UTM Coordinates [3] Y	No. of Samples Collected	Sample Split?
001	Lincoln Creek (d/s of Dry Hollow Creek)	Downgradient	43° 06' 32.3"	112° 06' 46.1"	409457.2	4773517.0	0[4]	--
002	Lincoln Creek below North Limb	Downgradient	43° 06' 16.1"	112° 06' 34.6"	409710.5	4773014.0	0[4]	--
003	O, P Pit Lake	Downgradient	43° 05' 42.6"	112° 05' 15.5"	411484.9	4771957.0	0[4]	--
004A	Cattle Pond A above O, P Pit (near reclaimed area)	Downgradient	43° 05' 31.2"	112° 05' 00.1"	411828.5	4771600.5	0[4]	--
004B	Cattle Pond B above O, P Pit (near reclaimed area)	Downgradient	43° 05' 31.7"	112° 05' 00.5"	411819.7	4771616.0	1	Yes
005	Lincoln Creek above North Limb	Upgradient	43° 05' 35.7"	112° 04' 42.4"	412230.5	4771734.5	1	Yes
006	Lincoln Peak Springs (Covered Springs, on Lincoln Creek going to east)	Downgradient	43° 06' 06.4"	112° 03' 41.3"	413623.8	4772664.0	1	No
007	Bronco Springs (almost due east of K Pit)	Upgradient	43° 04' 38.8"	112° 04' 04.2"	413071.7	4769968.5	1	No
008	Cow Spring (above K Pit)	Downgradient	43° 04' 37.4"	112° 05' 31.4"	411099.3	4769950.0	1	No
009	Source of Bunkhouse Spring	Upgradient	43° 03' 00.0"	112° 05' 05.6"	411643.9	4766938.0	0[4]	--
010	Main Holding Pond above A12 Pit	Upgradient	43° 02' 50.5"	112° 05' 51.7"	410597.1	4766659.0	1	Yes
011	Pond 1 above A12 Pit (East)	Downgradient	43° 02' 48.4"	112° 05' 52.9"	410569.1	4766594.5	1	No
012	Pond 2 above A12 Pit (West)	Downgradient	43° 02' 48.1"	112° 05' 58.6"	410440.1	4766587.0	1	No
013	A12 Lake in A12 Pit	Downgradient	43° 02' 42.8"	112° 06' 19.2"	409971.8	4766429.5	1	No
014	Big Willow Springs	Upgradient	43° 01' 57.3"	112° 05' 31.5"	411032.8	4765012.0	1	No
015	Willow Creek (Upper Ross Fork Creek) [5]	Downgradient	43° 01' 00.5"	112° 07' 17.2"	408617.4	4763291.0	0[4]	--
016	Lake in JD/JF Pit	Downgradient	43° 01' 09.8"	112° 07' 44.8"	407996.5	4763586.5	0[4]	--
017	Danielson Creek (above Ross Fork Creek)	Downgradient	43° 01' 15.8"	112° 09' 35.1"	405502.5	4763805.5	0[4]	--
018	Ross Fork Creek (d/s of Danielson Creek)	Downgradient	43° 00' 53.4"	112° 09' 48.7"	405185.2	4763118.5	1	Yes
019	Lower Ross Fork Creek (Narrows)	Upgradient	43° 00' 36.1"	112° 07' 59.3"	407654.3	4762551.0	1	Yes
020	Big Springs (spring only)	Upgradient	42° 59' 14.7"	112° 07' 22.4"	408456.1	4760029.5	1	Yes
021	Jeff Cabin Creek (water source for Falkner Ranch)	Upgradient	42° 57' 16.0"	112° 02' 14.8"	415376.9	4756278.0	1	Yes

Table 2-1. Sampling Locations, Site Descriptions, and Number of Samples Collected (continued)

Site No.	Site Description	Site Type [1]	Geographic Coordinates [2]		UTM Coordinates [3]		No. of Samples Collected	Sample Split?
			Latitude	Longitude	X	Y		
022	Lower Big Jimmy Creek Spring (area feeding into Portneuf River)	Upgradient	43° 00' 07.0"	111° 59' 57.3"	418555.1	4761515.1	1	Yes
023	Portneuf River (d/s of Bakers Creek)	Downgradient	43° 01' 15.2"	111° 58' 57.3"	419938.1	4763602.9	1	No
024	Portneuf River (above Bakers Creek)	Downgradient	43° 01' 22.4"	111° 58' 44.9"	420900.3	4763813.8	1	No
025	Z Pit Lake	Downgradient	43° 01' 16.0"	112° 01' 47.5"	416086.2	4763673.5	1	No
026	Queedup Springs (by Lone Pine Canyon Road)	Downgradient	43° 01' 33.3"	112° 01' 30.9"	416468.4	4764202.5	1	No
027	Bakers Creek below East Limb (above Queedup Springs)	Downgradient	43° 01' 35.6"	112° 01' 48.0"	416082.3	4764278.5	0[4]	--
028	Lone Pine Spring (Y Spring South, along Lone Pine Road)	Downgradient	43° 01' 34.1"	112° 02' 59.9"	414454.5	4764252.5	1	No
029	W Pit Lake	Downgradient	43° 02' 11.7"	112° 01' 48.2"	416091.4	4765392.0	1	No
030	Holding pond below Y intersection (above HH Pit)	Upgradient	43° 02' 29.6"	112° 03' 44.1"	413475.8	4765977.0	1	Yes
031	Portneuf River (above U Creek)	Background	43° 04' 20.6"	112° 00' 28.1"	417951.6	4769346.0	1	No
032	Red Rock Spring	Upgradient	43° 06' 01.6"	112° 01' 12.3"	416989.9	4772474.0	1	No
033	Mud Springs (north & east of mine, along road near Red Rock Spring)	Upgradient	43° 06' 09.2"	112° 01' 50.1"	416138.4	4772719.0	1	No
034	North Fork of Bakers Creek	Downgradient	43° 01' 22.6"	111° 59' 00.5"	419868.4	4763832.0	1	No
035	U Creek (above confluence with Portneuf River)	Downgradient	43° 04' 19.4"	112° 00' 30.8"	417890.1	4769310.0	1	Yes
Total Number of Site Samples Collected:							**27**	

[1] Site Types: Upgradient = Unimpacted Site; Downgradient = Potentially Impacted Site; Background = Reference Site

[2] Projection = Geographic (lat/long) NAD83, reported in degrees, minutes, seconds

[3] Projection = UTM NAD83 (Zone 12), reported in meters

[4] Sample not collected; site was dry

[5] Sampling site was identified as Willow Creek by Jim Simmons; previously identified as Upper Ross Fork Creek in the SAP (Appendix A; Parametrix, 2004)

d/s = Downstream

Field observations determined the specific locations at which surface water grab samples were collected at each site. Sampling locations were chosen so that (a) the field crew would avoid disturbing the site (i.e., entraining sediments) prior to collecting a sample, (b) the Hydrolab instrument could easily be placed *in situ* to record field parameters, and (c), in the case of creek sites, the site would not be expected to erode away over the life of the project.

2.2.2 Sampling Equipment

Samples were collected using the equipment specified in the approved SAP (Appendix A; Parametrix, 2004). SVL Analytical provided new, pre-cleaned 250 and 1000 mL HDPE sample bottles. Samples were collected either by hand or using a 12-foot extendable fiberglass pole. New sample bottles were used for each site. Samplers wore new gloves at each new sampling location prior to sample collection. For filtered samples, new clean Tygon® tubing and new cartridge filters were used for each sampling location and site water was used to purge the pump prior to collection of the sample. Field water quality data were collected using a Hydrolab instrument, which was calibrated and maintained per manufacturer's instructions, as outlined in the SAP (Appendix A; Parametrix, 2004).

2.2.3 Sampling Procedures

Filtered and unfiltered surface water grab samples were collected as specified in the approved SAP (Appendix A; Parametrix, 2004). Deviations from specified sample collection procedures that occurred are identified in Section 3.1. Hydrolab probes for the collection of the auxiliary field parameters were submerged as near to the point of sampling as was practical. Tribal representatives selected the split sample collection locations in the field. A total of 10 split samples were collected over the course of the sampling event.

2.2.4 Field Documentation

Field documentation included entries in a bound weatherproof field notebook and chain-of-custody forms with entries for each sample, as specified in the approved SAP (Appendix A; Parametrix, 2004). Entries in the field notebook included sampling dates and times, GPS coordinates of the sampling locations, site location numbers, field measurement data where collected, and general site observations. Copies of the field notebook pages are provided in Appendix B. Also included in Appendix B are copies of the sample chain-of custody forms, the Hydrolab calibration forms, the auxiliary field parameter data download from the Hydrolab unit, and the Shoshone-Bannock Tribe Registration and Tribal Business License Certificate for Parametrix. Additionally, digital photographs were taken at each sampling location. Copies of the site photos are presented in Appendix C.

2.3 CHEMICALS OF POTENTIAL CONCERN

Metals were determined to be the primary chemicals of potential concern (COPCs) at the site (Tetra Tech, 2002). The specific metals of concern for this monitoring event, the analyses conducted, and the corresponding surface water quality criteria are summarized in Table 2-2.

Table 2-2. COPCs in Surface Water Samples Collected at the Gay Mine, April 2004

COPC	Analysis Type	Analytical Method	Surface Water Quality Criteria (μg/L): Freshwater Aquatic Life Standards (Chronic) - Regulated Surface Water	Surface Water Quality Criteria (μg/L): Removal Action Levels – Non-Regulated Surface Water [f]
Cadmium (Cd)	Dissolved	EPA 213.2 (USEPA, 1983)	0.25 [a, c]	245
Chromium (Cr)	Dissolved	EPA 200.7 (USEPA, 1994)	74 [a, c] [Cr(III)] 10 [b] [Cr(VI)]	8,700
Nickel (Ni)	Dissolved	EPA 200.7 (USEPA, 1994)	52 [a, c]	614
Selenium (Se)	Total Recoverable	EPA 270.2 (USEPA, 1983)	5.0 [b, d]	201 [g] 50 [h] 5.0 [i]
Vanadium (V)	Total Recoverable & Dissolved	EPA 200.7 (USEPA, 1994)	NA [e]	972
Zinc (Zn)	Dissolved	EPA 200.7 (USEPA, 1994)	105 [b, c]	43,400

a – National Recommended Water Quality Criteria (USEPA, 2002a)

b – State of Idaho Surface Water Quality Standards (IAC, 2003a)

c – Criterion is expressed as a function of hardness and the pollutant's water effect ratio (WER); the value shown is for the dissolved metal corresponding to a hardness of 100 mg/L as CaCO3 and a WER of 1.0

d – Criterion is expressed as the total recoverable metal

e – Not available; no corresponding Surface Water Quality Criterion exists for this analyte

f – Removal action levels for surface waters not subject to CWA/IDAPA Biota Standards (IDEQ, 2004)

g – Transitory wildlife drinking water use

h – Domestic animal drinking water use

i – Riparian habitat use

In addition to the metals identified in Table 2-2, total hardness was determined for each surface water sample collected. These values were used to adjust the relevant hardness-dependant water quality criteria for specific metals (i.e., Cd, Cr, Ni, and Zn) in regulated surface waters, on a site-specific basis to allow for direct comparison with sample results. Additional field measurements taken at the time of sample collection included dissolved oxygen concentration, pH, water temperature, and conductivity.

3. SAMPLING RESULTS

3.1 DEVIATIONS FROM ESTABLISHED SAP PROCEDURES

Deviations from the approved SAP (Appendix A; Parametrix, 2004) that occurred during the April 2004 surface water-sampling event were as follows:

- At Sites 005 (Lincoln Creek above North Limb), 007 (Bronco Springs), 008 (Cow Spring), 022 (Lower Big Jimmy Creek Spring), 028 (Lone Pine Spring), and 032 (Red Rock Spring), water levels were inadequate to fully submerge the 1000 mL sample collection bottle. In these cases a "dipper" bottle, created by cutting off the top of a new clean 250 mL bottle, was used to collect the sample and this water was then poured into the sample collection bottle. Additionally, in these cases the water was too shallow to submerge the Hydrolab probes; therefore a container of an appropriate size was filled with site water using the same dipper bottle and the probes were submerged in the container to measure the field parameters. Every effort was made to do this as quickly as possible, so that the parameters did not change due to ambient air exposure.
- At the Big Willow Springs sampling site (Site 014), a sample could not be obtained directly from the source, as the spring and its channel were dry; however, a watering trough plumbed with underground pipes was being supplied by water that apparently originated deeper in the spring. A sample for this site was collected from the end of the pipe supplying the watering trough.
- At the Red Rock Springs sampling site (Site 032), a sample could not be obtained directly from the source as the spring was covered by approximately eight feet of snow. A sample was collected from the channelized water flow below the spring, where the snow ended. This sample potentially contained a large portion of snowmelt mixed with the spring water.
- At the end of the first day of sampling, sample filtering was conducted in a field crewmember's hotel room rather than in the field as specified in the SAP, due in part to a delay in receiving the peristaltic pump and filter tubing. Tribal representatives were invited to observe the filtering of their split samples (and all others), but declined. On the second day of sampling, sample filtering was again conducted in the same manner (i.e., at hotel rather than in the field), since it was efficient and allowed the field crew to maximize the available daylight hours in the field for sampling. Tribal members again declined to observe the filtering of the day's samples. On the third day of sampling, the final samples were filtered at the tribal office (again not in the field) with two tribal representatives in attendance.

None of these deviations were judged to have significantly affected the integrity or quality of the data obtained.

3.2 QUALITY ASSURANCE/QUALITY CONTROL

3.2.1 Sample Handling

As specified in the approved SAP (Appendix A; Parametrix, 2004), all samples were kept in coolers and held at approximately 4°C until they were shipped to SVL Analytical. Filtration of dissolved samples occurred within 24 hours of collection and no samples were frozen. Upon sample receipt, the laboratory complied with applicable storage requirements. Sample preparation and analysis were conducted within the method-specified holding times.

3.2.2 Chain of Custody Procedures

As specified in the approved SAP (Appendix A; Parametrix, 2004), chain-of-custody procedures were used to document the transfer of all samples from the field crew to the analytical laboratory. Duplicate chain-of-custody forms were used to record each sample collected and identified the sample collection date and time, the project name and number, and the number of preserved and unpreserved sample containers. One copy of the form was placed in a waterproof bag and placed inside the sample cooler. Sample coolers were sealed with chain-of-custody tape and kept in a secure location when not in the presence of Parametrix sampling personnel. All samples were shipped to the laboratory within 48 hours of collection. Upon receipt of the samples at SVL, the samples were inspected, the condition of the samples was recorded, and the receiving laboratory staff signed the chain-of-custody forms. From that point until final sample disposal, SVL maintained sample custody using its Laboratory Information Management System (LIMS).

3.2.3 Sample Temperatures

Upon receipt at the laboratory, the shipment cooler temperatures ranged from 8-9°C. The samples were shipped in coolers surrounded with ice; however, as the shipment to the laboratory occurred over a weekend, the ice melted and the cooler temperatures rose. This is a routine occurrence. The <4°C storage condition reported in the approved SAP (Appendix A; Parametrix, 2004) is a general guideline, rather than a method requirement. According to USEPA (1983, 1984) and Standard Methods (APHA, AWWA, and WEF, 1995), water samples being analyzed for metals may be stored at room temperature provided they are preserved with nitric acid after collection. Nitric acid preservative (1:1) was added to each Gay Mine sample during transfer to the 250-mL sample bottles. Upon receipt of the samples, SVL stored each fraction (i.e., filtered and unfiltered) in a non-refrigerated room where preserved metals samples are stored prior to preparation and analysis.

3.2.4 Field Quality Control

Field quality control samples, including field duplicate samples, bottle blanks, and filter blanks were collected at the appropriate frequency, as specified in the approved SAP (Appendix A; Parametrix, 2004). The results of the analysis of the filter blanks, bottle blanks and field duplicates are provided in Tables 3-1, 3-2, and 3-3, respectively.

Table 3-1. Summary of Filter Blank Results

Blank No.	Dissolved Cd (μg/L)	Dissolved Cr (μg/L)	Dissolved Ni (μg/L)	Dissolved V (μg/L)	Dissolved Zn (μg/L)
1 (4/6/04)	<0.10	<6.0	<10	<5.0	<5.0
2 (4/7/04)	<0.10	<6.0	<10	<5.0	<5.0
3 (4/8/04)	<0.10	<6.0	<10	<5.0	<5.0

No analytes of concern were detected in the filter blanks collected for this sampling event, indicating a low potential for sample contamination from the filters used.

Table 3-2. Summary of Bottle Blank Results

Blank No.	Hardness (mg/L as $CaCO_3$)	Total Recoverable Cd (µg/L)	Total Recoverable Cr (µg/L)	Total Recoverable Ni (µg/L)	Total Recoverable Se (µg/L)	Total Recoverable V (µg/L)	Total Recoverable Zn (µg/L)
250 mL Sample Bottles							
1 (4/6/04)	<0.265	<0.10	<6.0	<10	<3.0	<5.0	<5.0
2 (4/7/04)	<0.265	<0.10	<6.0	<10	<3.0	<5.0	<5.0
3 (4/8/04)	<0.265	<0.10	<6.0	<10	<3.0	<5.0	<5.0
1000 mL Collection Bottles							
1 (4/6/04)	<0.265	<0.10	<6.0	<10	<3.0	<5.0	<5.0
2 (4/7/04)	<0.265	<0.10	<6.0	<10	<3.0	<5.0	<5.0
3 (4/8/04)	<0.265	<0.10	<6.0	<10	<3.0	<5.0	<5.0

No analytes of concern were detected in either the 250-mL or 1000-mL bottle blanks collected during this sampling event, indicating a low potential for sample contamination from the sample containers used.

Table 3-3. Summary of Field Duplicate Results

Sample #	Hardness		Dissolved Cd		Dissolved Cr		Dissolved Ni	
	(mg/L as $CaCO_3$)	RPD	(µg/L)	RPD	(µg/L)	RPD	(µg/L)	RPD
013 (4/6/04)	639	2.7	<0.1	NC	<6.0	NC	14	7.4
013 Dup (4/6/04)	622		<0.1		<6.0		13	
026 (4/7/04)	650	0.5	0.1	0.0	<6.0	NC	<10	NC
026 Dup (4/7/04)	647		0.1		<6.0		<10	
031 (4/8/04)	238	2.1	<0.1	NC	<6.0	NC	<10	NC
031 Dup (4/8/04)	243		<0.1		<6.0		<10	

Sample #	Total Recoverable Se		Total Recoverable V		Dissolved V		Dissolved Zn	
	(µg/L)	RPD	(µg/L)	RPD	(µg/L)	RPD	(µg/L)	RPD
013 (4/6/04)	638	4.8	12.7	0.0	12.6	0.8	<5.0	NC
013 Dup (4/6/04)	608		12.7		12.7		<5.0	
026 (4/7/04)	<3.0	NC	<5.0	NC	<5.0	NC	16.5	5.9
026 Dup (4/7/04)	<3.0		<5.0		<5.0		17.5	
031 (4/8/04)	<3.0	NC	<5.0	NC	<5.0	NC	<5.0	NC
031 Dup (4/8/04)	<3.0		<5.0		<5.0		<5.0	

NC = Not calculated; RPD is not calculated if one or both duplicate results are non-detect

RPD = Relative Percent Difference

Field duplicate sample results were very similar, indicating acceptable precision was achieved with the sampling procedures used.

3.2.5 Analytical Quality Control

As specified in the approved SAP (Appendix A; Parametrix, 2004), analytical quality control procedures to verify precision and accuracy were conducted according to the SVL QA Manual (SVL, 2003). These procedures included analysis of method blanks, laboratory control samples or blank spike samples, matrix spike samples, and sample duplicate analyses at the appropriate, method-specified frequency.

3.2.6 Data Quality Control/Quality Assurance Review

In addition to the internal review performed by the analytical laboratory, Parametrix personnel performed an independent review of the analytical data generated for this project in order to verify all sample and QC results and assess the usefulness of the data for the project. This review was conducted using the USEPA Contract Laboratory Program (CLP) National Functional Guidelines for Inorganic Data Review (USEPA 2002) and the approved project SAP (Appendix A; Parametrix 2004) for guidance. Data review included evaluation of the following:

- Analytical holding times;
- Method reporting limits (MRLs);
- Method blanks;
- Laboratory control sample (LCS) and matrix spike (MS) recoveries;
- Sample duplicate results and relative percent differences (RPDs); and
- Field QC sample results.

The Level 2 data packages submitted by SVL were sufficient for this review. Copies of the laboratory data reports are presented in Appendix D. All packages included a brief case narrative summary of the work performed and any problems encountered during analysis, summary sample results, and summary analytical QC results. All samples were prepared and analyzed within holding times and using appropriate methods. Analytical accuracy and precision were acceptable, as demonstrated by the results of the laboratory QC analyses. Field QC sample results were also acceptable. No data were qualified based on the results of this review and all data reported are considered to be valid, representative of the samples collected, and acceptable for further use. A copy of the technical memorandum summarizing the data review, including the data review checklist, is presented in Appendix E.

3.3 CHEMISTRY DATA

3.3.1 Metals

The analytical results for the Gay Mine surface water samples collected in April 2004 are presented in Table 3-4. Samples were collected from both regulated and non-regulated surface waters, as defined in the State of Idaho's Area Wide Risk Management Plan for the Southeast Idaho Phosphate Mining Resource Area (IDEQ, 2004).

Regulated surface waters include all streams, rivers, reservoirs and contributing waters from seeps, springs and intermittent runoff pathways (IDEQ, 2004). Site data for regulated surface waters were compared against the corresponding chronic surface water quality criteria protective of aquatic life for the metal of interest. These values were the lower value of either the current State of Idaho Numeric Criteria for Toxic Substances for Waters Designated for Aquatic Life, Recreation, or Domestic Water Supply Use (IAC, 2003a) or the current USEPA National Recommended Water Quality Criteria for Priority Toxic Pollutants (USEPA, 2002a).

Table 3-4. Summary of Surface Water Data and Comparison with Water Quality Criteria, April 2004 Sampling

Site No.	Water Type[a]	Hardness (mg/L as $CaCO_3$)	Diss. Cd (µg/L)		Diss. Cr (µg/L)		Diss. Ni (µg/L)		TR Se (µg/L)		TR V (µg/L)	Diss. V (µg/L)	Diss. Zn (µg/L)	
		Sample Level	Sample Level	*Criteria[b]/ Action Level*	Sample Level	*Criteria[b]/ Action Level*	Sample Level	*Criteria[b]/ Action Level*	Sample Level	*Criteria/ Action Level*	Sample Level	Sample Level	Sample Level	*Criteria[b]/ Action Level*
001	R	NC	NC	--	NC	--	NC	--	NC	--	NC	NC	NC	--
002	R	NC	NC	--	NC	--	NC	--	NC	--	NC	NC	NC	--
003	NR	NC	NC	--	NC	--	NC	--	NC	--	NC	NC	NC	--
004A	NR	NC	NC	--	NC	--	NC	--	NC	--	NC	NC	NC	--
004B	NR	196	<0.10	*245*	<6.0	*8700*	<10	*614*	4.0	*50 [c]*	5.7	<5.0	<5.0	*43400*
005	R	338	<0.10	*0.572*	<6.0	*201*	<10	*146*	<3.0	*5.0*	<5.0	<5.0	<5.0	*332*
006	R	237	<0.10	*0.448*	<6.0	*150*	<10	*108*	<3.0	*5.0*	<5.0	<5.0	<5.0	*245*
007	R	263	<0.10	*0.481*	<6.0	*164*	<10	*118*	<3.0	*5.0*	<5.0	<5.0	<5.0	*268*
008	R	352	<0.10	*0.589*	<6.0	*208*	<10	*151*	<3.0	*5.0*	<5.0	<5.0	<5.0	*343*
009	R	NC	NC	--	NC	--	NC	--	NC	--	NC	NC	NC	--
010	NR	782	<0.10	*245*	<6.0	*8700*	<10	*614*	<3.0	*201 [d]*	<5.0	<5.0	<5.0	*43400*
011	NR	603	<0.10	*245*	<6.0	*8700*	<10	*614*	<3.0	*201 [d]*	<5.0	<5.0	<5.0	*43400*
012	NR	355	0.30	*245*	<6.0	*8700*	<10	*614*	171	*201 [d]*	12	11.7	<5.0	*43400*
013	NR	639	<0.10	*245*	<6.0	*8700*	14	*614*	**638**	*201 [d]*	12.7	12.6	<5.0	*43400*
014	R	415	<0.10	*0.660*	<6.0	*238*	<10	*173*	<3.0	*5.0*	<5.0	<5.0	32.2	*395*
015	R	NC	NC	--	NC	--	NC	--	NC	--	NC	NC	NC	--
016	NR	NC	NC	--	NC	--	NC	--	NC	--	NC	NC	NC	--
017	R	NC	NC	--	NC	--	NC	--	NC	--	NC	NC	NC	--
018	R	125	<0.10	*0.287*	<6.0	*89*	<10	*63*	<3.0	*5.0*	<5.0	<5.0	<5.0	*143*
019	R	132	<0.10	*0.298*	<6.0	*93*	<10	*66*	<3.0	*5.0*	<5.0	<5.0	<5.0	*149*
020	R	117	<0.10	*0.274*	<6.0	*84*	<10	*59*	<3.0	*5.0*	<5.0	<5.0	<5.0	*135*
021	R	151	<0.10	*0.328*	<6.0	*104*	<10	*74*	<3.0	*5.0*	<5.0	<5.0	<5.0	*168*
022	R	295	<0.10	*0.521*	<6.0	*180*	<10	*130*	<3.0	*5.0*	37.6	37.4	<5.0	*295*
023	R	381	<0.10	*0.622*	<6.0	*222*	<10	*161*	<3.0	*5.0*	<5.0	<5.0	<5.0	*367*
024	R	290	<0.10	*0.515*	<6.0	*177*	<10	*128*	<3.0	*5.0*	<5.0	<5.0	<5.0	*291*
025	NR	236	0.50	*245*	<6.0	*8700*	12	*614*	9.0	*201 [d]*	14	6.2	<5.0	*43400*

Table 3-4. Summary of Surface Water Data and Comparison with Water Quality Criteria, April 2004 Sampling (continued)

Site No.	Water Type[a]	Hardness (mg/L as $CaCO_3$)	Diss. Cd (μg/L)		Diss. Cr (μg/L)		Diss. Ni (μg/L)		TR Se (μg/L)		TR V (μg/L)	Diss. V (μg/L)	Diss. Zn (μg/L)	
		Sample Level	Sample Level	*Criteria[b]/ Action Level*	Sample Level	*Criteria[b]/ Action Level*	Sample Level	*Criteria[b]/ Action Level*	Sample Level	*Criteria/ Action Level*	Sample Level	Sample Level	Sample Level	*Criteria[b]/ Action Level*
026	R	650	0.10	*0.900*	<6.0	*343*	<10	*253*	<3.0	*5.0*	<5.0	<5.0	16.5	*577*
027	R	NC	NC	--	NC	--	NC	--	NC	*5.0*	NC	NC	NC	--
028	R	444	<0.10	*0.691*	<6.0	*251*	<10	*184*	<3.0	*5.0*	<5.0	<5.0	<5.0	*418*
029	NR	950	<0.10	*245*	<6.0	*8700*	17	*614*	<6.0	*201* [d]	<5.0	<5.0	<5.0	*43400*
030	NR	442	<0.10	*245*	<6.0	*8700*	<10	*614*	<3.0	*201* [d]	<5.0	<5.0	<5.0	*43400*
031	R	238	<0.10	*0.449*	<6.0	*151*	<10	*108*	<3.0	*5.0*	<5.0	<5.0	<5.0	*246*
032	R	63.8	<0.10	*0.180*	<6.0	*51*	<10	*36*	<3.0	*5.0*	<5.0	<5.0	<5.0	*81*
033	R	148	<0.10	*0.323*	<6.0	*102*	<10	*72*	<3.0	*5.0*	<5.0	<5.0	<5.0	*165*
034	R	486	<0.10	*0.736*	<6.0	*271*	<10	*198*	<3.0	*5.0*	<5.0	<5.0	<5.0	*451*
035	R	319	<0.10	*0.550*	<6.0	*192*	<10	*139*	<3.0	*5.0*	<5.0	<5.0	<5.0	*316*

[a] Water Type = Sample was collected from either a regulated or non-regulated surface water, as defined in the State of Idaho's Area Wide Risk Management Plan for the Southeast Idaho Phosphate Mining Resource Area (IDEQ, 2004)

[b] Criteria for regulated surface waters were adjusted on a site-specific basis using the measured hardness values for each site (see Section 3.3.1)

[c] Tier 2 selenium action level (50 μg/L) – domestic animal drinking water use (IDEQ, 2004)

[d] Tier 1 selenium action level (201 μg/L) – transitory wildlife drinking water use (IDEQ, 2004)

Bolded value = Concentration exceeded the corresponding applicable surface water quality criterion or action level listed

Diss. = Dissolved metal

NA = No corresponding surface water quality criterion

NC = No sample collected for this location; site was dry

NR = Non-regulated surface water (e.g., pit lakes, ponds, sedimentation basins, etc.)

R = Regulated surface water (e.g., streams, rivers, reservoirs, contributing waters from seeps, springs or intermittent runoff pathways, etc.)

TR = Total recoverable metal

The USEPA's ambient water quality criteria (AWQC) (USEPA, 2002a) and the State of Idaho's water quality standards (WQS) (IAC, 2003a) both list chronic criteria protective of aquatic life for cadmium, chromium(III and VI), nickel, selenium, and zinc. No such criteria currently exist for vanadium. The values chosen for comparison with site data were the lower value of either the AWQC or the WQS criteria for each metal (for simplicity, the values chosen will hereafter be referred to as the "criteria"). The criteria for cadmium, chromium(III and VI), nickel, and zinc are based on the dissolved metal fraction because this measurement more closely represents the bioavailable fraction than do measurements of the total recoverable metal fraction for these COPCs (Prothro, 1993). The criterion for selenium is based on total recoverable metal because its toxicity to fish, the basis of the criterion, is primarily manifested via the dietary pathway (USEPA, 1987). The criteria for cadmium, chromium(III), nickel, and zinc are also hardness-dependent (i.e., the lower the hardness, the more bioavailable the metal and the lower the criterion). The USEPA has developed equations, which have also been adopted by the State of Idaho, for adjusting hardness-dependent criteria on a site-specific basis. These equations and the metal-specific coefficients entered into the equations can be found in either USEPA (2002a) or IDAPA 58.01.02 (IAC, 2003a).

Non-regulated surface waters include pit lakes, ponds, sedimentation basins, and other waters not originally intended to provide essential ecological habitat or support aquatic life (IDEQ, 2004). Site data for regulated surface waters were compared against the removal action levels for surface waters not subject to current water quality standards specified in the Area Wide Risk Management Plan (IDEQ, 2004). These action levels incorporate a three-tiered approach for selenium. The first tier (i.e. tier 1), which assumes that exposure occurs only through drinking water ingestion by transitory wildlife and is the intended exposure level for "industrial" surface waters (IDEQ, 2004), was judged to apply to the mine pit lakes and holding ponds sampled at the Gay Mine. The second tier (i.e., tier 2), applied to surface waters used as a source of domestic animal drinking water (IDEQ, 2004), was judged to apply to the cattle ponds sampled at the Gay Mine. The tier 3 action level, applied to surface waters that have developed critical riparian habitat beyond their intended use (IDEQ, 2004), was judged not to apply to any of the non-regulated surface waters sampled at the Gay Mine. The initial determinations as to which level non-regulated surface water sources fall under are preliminary and are subject to change based on the decisions of appropriate agency personnel after the signing of an Administrative Order on Consent (AOC).

3.3.1.1 Cadmium

The analytical detection limit for dissolved cadmium (0.1 µg/L) was less than both the site-specific, hardness adjusted criteria for regulated surface waters (see adjusted values in Table 3-4) and the removal action level for non-regulated surface waters (245 µg/L), indicating that the detection limit was sufficiently low to meet the objectives of the project. The majority of sites were non-detect for cadmium; only Sites 012 (Pond 2 above A12 Pit [West]), 025 (Z Pit Lake), and 026 (Queedup Springs) had levels above the detection limit. None of the sites with detected cadmium had concentrations that exceeded the corresponding action levels for regulated or non-regulated surface waters.

3.3.1.2 Chromium

The analytical detection limit for dissolved chromium (6.0 µg/L) was less than both the site-specific, hardness adjusted criteria for chromium(III) (see adjusted values in Table 3-4) and the non-hardness dependant criterion for chromium(VI) (10 µg/L) for regulated surface waters, as well as the removal action level for non-regulated surface waters (8,700 mg/L) indicating that the detection limit was sufficiently low to meet the objectives of the project. Chromium was not detected at any of the sites.

3.3.1.3 Nickel

The analytical detection limit for dissolved nickel (10 μg/L) was less than both the site-specific, hardness adjusted criteria for regulated surface waters (see adjusted values in Table 3-4) and the removal action level for non-regulated surface waters (614 μg/L), indicating that the detection limit was sufficiently low to meet the objectives of the project. The majority of sites were non-detect for nickel; only Sites 013 (A12 Lake in A12 Pit), 025 (Z Pit Lake), and 029 (W Pit Lake) had levels above the detection limit. None of the sites with detected nickel had concentrations that exceeded the corresponding action levels for regulated or non-regulated surface waters.

3.3.1.4 Selenium

The analytical detection limit for total recoverable selenium (3.0 μg/L) was less than both the criterion for regulated surface waters (5.0 μg/L) and the removal action levels for non-regulated surface waters (Tier 1: 201 μg/L, Tier 2: 50 μg/L, and Tier 3: 5.0 μg/L), indicating that the detection limit was sufficiently low to meet the project objectives. The majority of sites were non-detect for selenium; only Sites 004B (Cattle Pond B above O,P Pit), 012 (Pond 2 above A12 Pit [West]), 013 (A12 Lake in A12 Pit), and 025 (Z Pit Lake) had levels above the detection limit. Of these, only Site 013 was found to have a total recoverable selenium concentration that exceeded the corresponding removal action level for non-regulated surface water, assuming only transitory wildlife drinking use (Tier 1: 210 μg/L).

3.3.1.5 Vanadium

There are currently no water-quality criteria established for either total recoverable or dissolved vanadium in regulated surface waters. The removal action level for vanadium in non-regulated surface waters is 972 μg/L. The majority of sites were non-detect for vanadium. Total recoverable vanadium was detected at Sites 004B (Cattle Pond B above O,P Pit), 012 (Pond 2 above A12 Pit [West]), 013 (A12 Lake in A12 Pit), 022 (Lower Big Jimmy Creek Spring), and 025 (Z Pit Lake), while dissolved vanadium was only detected at Sites 012, 013, 022 and 025. For Sites 012, 013, and 022, dissolved concentrations were approximately equal to total recoverable levels, indicating that dissolved vanadium was the primary form of the metal at those locations.

A risk-based aquatic life toxicity chronic value of 170 μg/L has been determined for vanadium (Kimball, 1978). This value is the geometric mean of a no-observable-effect concentration (NOEC) of 120 μg/L and a lowest-observable-effect concentration (LOEC) of 240 μg/L for fathead minnow (*Pimephales promelas*) growth in a 28-day early life stage study. Detected total recoverable and dissolved vanadium concentrations ranged from 5.7-37.6 μg/L and 6.2-37.4 μg/L, respectively, and were well below both the reported risk-based chronic value and the non-regulated surface water action level.

3.3.1.6 Zinc

The analytical detection limit for dissolved zinc (5.0 μg/L) was less than both the site-specific, hardness adjusted criteria for regulated surface waters (see adjusted values in Table 3-4) and the removal action level for non-regulated surface waters (43,400 μg/L), indicating that the detection limit was sufficiently low to meet the project objectives. The majority of sites were non-detect for zinc; only Sites 014 (Big Willow Springs) and 026 (Queedup Springs) had levels above the detection limit. None of the sites with detected zinc had concentrations that exceeded the corresponding action levels for regulated or non-regulated surface waters.

3.3.2 Water Quality Auxiliary Parameters

Auxiliary parameter data measured in the field for each Gay Mine surface water sample collected in April 2004 are presented in Table 3-5.

Table 3-5. Summary of Water Quality Auxiliary Field Parameter Data

Site No.	Site Type [1]	Temperature (ºC)	pH	DO (mg/L)	Specific Conductivity (μS/cm)
001	Downgradient	NC	NC	NC	NC
002	Downgradient	NC	NC	NC	NC
003	Downgradient	NC	NC	NC	NC
004A	Downgradient	NC	NC	NC	NC
004B	Downgradient	12.6	8.2	7.14	0.391
005	Upgradient	18.4	7.7	5.08	0.546
006	Downgradient	11.1	7.4	4.26	0.412
007	Upgradient	7.0	7.9	6.38	0.194
008	Downgradient	6.6	7.3	4.97	0.720
009	Upgradient	NC	NC	NC	NC
010	Upgradient	13.1	8.7	9.89	1.870
011	Downgradient	15.5	8.4	10.08	1.458
012	Downgradient	14.5	8.9	11.33	0.742
013	Downgradient	15.1	9.1	14.23	1.241
014	Upgradient	8.6	7.4	4.31	0.908
015	Downgradient	NC	NC	NC	NC
016	Downgradient	NC	NC	NC	NC
017	Downgradient	NC	NC	NC	NC
018	Downgradient	7.9	8.1	10.13	0.265
019	Upgradient	8.0	8.6	10.03	0.253
020	Upgradient	8.4	7.8	9.07	0.229
021	Upgradient	10.4	8.5	9.35	0.282
022	Upgradient	6.6	7.9	2.36	0.634
023	Downgradient	14.6	8.1	8.87	0.736
024	Downgradient	15.7	8.1	7.84	0.583
025	Downgradient	9.8	8.8	12.97	0.609
026	Downgradient	17.7	7.2	3.09	1.046
027	Downgradient	NC	NC	NC	NC
028	Downgradient	7.0	7.8	7.24	0.785
029	Downgradient	15.4	8.7	10.97	1.328
030	Upgradient	11.9	8.5	10.15	0.919
031	Background	9.5	8.1	7.95	0.488

Table 3-5. Summary of Water Quality Auxiliary Field Parameter Data (continued)

Site No.	Site Type [1]	Temperature (ºC)	pH	DO (mg/L)	Specific Conductivity (µS/cm)
032	Upgradient	1.6	8.6	11.00	0.170
033	Upgradient	6.2	7.9	3.11	0.308
034	Downgradient	9.8	8.0	8.34	0.944
035	Downgradient	4.5	8.0	9.52	0.654

[1] Site Types: Upgradient = Unimpacted Site; Downgradient = Potentially Impacted Site; Background = Reference Site

NC = No data collected for this location; site was dry

3.3.2.1 Temperature

Water temperature did not differ substantially between Upgradient (1.6-13.1ºC), Downgradient (4.5-17.7ºC), and Background (9.5ºC) sites. Additionally, all temperatures were less than the State of Idaho general water quality criterion for all aquatic life uses (22ºC or less and a daily maximum not greater than 19ºC) (IAC, 2003b).

3.3.2.2 pH

pH levels did not differ substantially between Upgradient (7.4-8.7), Downgradient (7.2-9.1), and Background (8.1) sites. Additionally, all pH levels were within the State of Idaho general water quality criteria range for all aquatic life uses (6.5-9.0) (IAC, 2003b), except for one Downgradient site (Site 013, A12 Lake in A12 Pit) with a pH of 9.1.

3.3.2.3 Dissolved Oxygen

Dissolved oxygen (DO) levels did not differ substantially between Upgradient (2.36-11.00 mg/L), Downgradient (3.09-14.23 mg/L), and Background (7.95 mg/L) sites. The State of Idaho general water quality criterion for all aquatic life uses for DO is >6.0 mg/L at all times (IAC, 2003b), and there were both Upgradient and Downgradient sites that did not meet this criterion. Upgradient sites with DO levels less than 6.0 mg/L were Sites 005 (Lincoln Creek above North Limb), 014 (Big Willow Springs), 022 (Lower Big Jimmy Creek Spring), and 033 (Mud Springs). Downgradient sites with DO levels less than 6.0 mg/L were Sites 006 (Lincoln Peak Springs), 008 (Cow Spring), and 026 (Queedup Springs).

3.3.2.4 Specific Conductivity

Specific conductivity did not differ substantially between Upgradient (0.170-1.870 µS/cm), Downgradient (0.265-1.458 µS/cm), and Background (0.488 µS/cm) sites. There is currently no State of Idaho general water quality criterion for all aquatic life uses for conductivity.

3.4 FUTURE DATA USE

The data contained in this report are considered appropriate for future use in any future investigations and/or evaluations at the site. Though filtering of dissolved samples was not conducted *in the field* on the three sampling days as specified in the SAP, the samples were filtered within the time frame outlined in the SAP and in accordance with all other SAP filtering protocols. Therefore, this deviation did not affect sample integrity or quality and all samples were filtered within the method-specified 24-hour period. The data resulting from this sampling effort should be more than sufficient for use in any future data gap analyses, risk assessment and/or engineering evaluations, though the deviation from the filtering protocol will continue to be noted, as requested by the Shoshone-Bannock Tribe.

4. REFERENCES

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APPENDIX A

Sampling and Analysis Plan

APPENDIX B

Field Sampling Notes

APPENDIX C

Site Photographs

Cattle Ponds Above O & P Pits – 04B

A12 Lake in A12 Pit - 013

Lake in JD/JF pit - 016

Z-Pit Lake

Z-Pit Lake

W Pit Lake - 029

Portneuf River (d/s of Bakers Creek) - 023

APPENDIX D

Laboratory Data Reports

APPENDIX E

Data QA/QC Review